REPORT OF SOLVENT DISCHARGE FROM THE McKESSON FACILITY TO THE FORMER ANGELES CHEMICAL COMPANY

File under

FOR

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1.0) INTRODUCTION

Blakely Environmental Investigations, Inc. (BEII) was contracted by Greve Financial Services, Inc. (Greve) to review all available data concerning the McKesson facility and to determine the possible discharge of solvents onto the former Angeles Chemical Company (Angeles) property located adjacent to the McKesson facility to the north.

BEII identified records of "numerous" regulatory notices of violation, citations, cease and desist, and clean up orders issued to the McKesson facility since 1980. These regulatory violation records identify that McKesson continued to discharge solvent contaminated water into the subsurface soil and groundwater adjacent to the Angeles Chemicals property on a regular basis during the lifetime of solvent mixing operations on the site from 1977 until 1986. Regulatory documents further identify that the daily waste stream was at a minimum 1,500 gallons of solvent wastewater per day.

The McKesson facility generated two primary waste streams of solvent wastewater. One waste stream was runoff of the solvent wastewater collected into a 90-gallon capacity sump at the facility low point and emptied into the unlined drainage ditch by a "trap door " device. The trap door discharged liquid, which was tested for pH and specific gravity only, according to the USEPA. The second waste stream was the solvent waste liquid pooled in the solvent above ground tank area (solvent area) adjacent to the solvent packaging area, 80' from the solvent drum wash shed and adjacent to the solvent collection tank (Plate 1).

The numerous regulatory site inspection reports and notices of violation concerning pooled liquid standing for months and up to a year after operations were closed in 1986, identify that the soil column had become saturated to the permeable zone at 15' to 25' below grade (bg). The permeable soil zone from 15' to 25' bg was saturated with perched groundwater until at least one year after McKesson operations closed in 1986. The solvent waste water infiltrated to the permeable soil and saturated the soil column at the solvent area so that free standing solvent waste water was identified pooled in that area during regulatory on-site inspections since 1977 and up to a year after operations, including solvent barrel and line rinsing.

The USEPA, the Los Angeles County Engineering Section, the Department of Health Services, the Los Angeles Regional Water Quality control board, the Department of Toxic Substances Control, and the City of Santa Fe Springs have all issued citations, notices of violation, and clean up orders to McKesson since 1977. The orders addressed three areas of discharging and spilling of contaminant waste, the solvent area and the waste collection sump and also included the underground storage tanks (USTs). All of these areas are within 50' of the northern edge of the McKesson facility, which is adjacent to the former Angeles property.

McKesson failed to identify the results of testing performed by McKesson Environmental in 1986, which identified a subsurface permeable zone at 15' to 25' bg containing free phase or DNAPL (dense non-aqueous phase liquid) solvents up to 8 times the saturation level of the water. The permeable zone slopes northward at 0.005 feet per foot (Harding and Lawson, 1992) and with solvent concentrations dissolved in groundwater decreasing significantly from south to

north. This data deleted in subsequent contaminant and contaminant flow maps documented the northward gradient of migration of much of the discharged solvents.

The permeable zone at 15' to 25' bg has a depression identified at the deepest point tested in well MW-6 on the Angeles Chemical site (Plate 2). The highest solvent concentrations have been identified on the Angeles site at 20' bg in MW-6 at levels with only trace concentrations in the soil at 5' bg in the same well. The McKesson facility identified solvent contamination in the solvent area surface pooled water and the subsurface water migrating onto the Angeles property at 3 to 8 times the saturation level of 1,1,1-TCA, for example, one of several solvents dumped or leached onto the Angeles property.

Documentation of the highest areas of contamination bordering the Angeles site and identified by the USEPA and McKesson in 1986, have been erased from all site contaminant maps and maps of contaminant flow. Documentation of the maximum dissolved solvents in the perched water is listed as part of the site history, but is not included in subsurface contaminant maps and conclusions.

As identified in the March 9,1992 memorandum from Louis Levy, TSSB, Region 3 of the DTSC, to Doug Suzuki, " this has been one of the more difficult Health Risk Assessments (HRA) I have had to review. The greatest problem is the actual sampling information. There are tables in the appendix of Volume 1 of the earlier sampling without good identification of the location of those earlier samples. There does not appear to be any sampling below the underground storage tanks". Mr. Levy specified specifically, paragraph 4.2.4 "Where are the data for the 1984, 1986 and 1989 sampling. These data should be summarized, located on a map and appropriately referred to". In the same paragraph, Mr. Levy asked "... are the 1990 and 1991 samples part of a "Previous Investigations" or are they the present investigation? If the latter is true then the information is misplaced?"

All maximum solvent concentrations identified in the solvent area surface water, permeable soil and perched water have been altered by deletion of the worst case groundwater monitoring wells MW-1 through MW-4, and soil borings SB-1 through SB-3. The deletion of these wells and the analysis of soil and groundwater identified from the wells and borings removes the three maximum dissolved solvent concentrations. The deletion of maximum levels and gradient lines showing solvent concentrations in soil and groundwater alters the migration assumptions concerning the discharges from McKesson, which infiltrated into the permeable soil at 15' to 25' bg and remained saturated for the length of solvent rinsing operations at the McKesson facility from 1977 until 1986.

It has further been identified that regulatory citations, cease and desist orders, and notices of violation were issued for pooled solvent water and discharges into the unlined drainage ditch. It has also been identified that McKesson did not receive an NPDES permit for discharging into the unlined drainage ditch separating the McKesson facility from Angeles property. It was also identified that McKesson did not address RCRA requirements for site closure prior to the closure of operations in 1986.

2.0) MAXIMUM SOLVENT CONCENTRATIONS IN SOIL AND GROUNDWATER

McKesson closed the facility in 1986 without regulatory approval, after being informed that the discharge of solvents and acid wastewater into the gravel filled; bermed, solvent area and the unlined ditch were not permitted according to RCRA requirements. McKesson and the USEPA tested the facility in March and April and identified multiple DNAPL or free phase solvents, including 1,1,1-TCA, PCE, TCE and Methylene Chloride, in 3 of 4 groundwater monitoring wells. Aggregate dissolved concentrations of the above solvents are 1,597 ppm in MW-4 on the south, 1,424 ppm in MW-1 northeast of the solvent area (see Plate 3), and 300 ppm in MW-3 on the northwest side of the solvent area. In addition, 94 ppm as PCE was identified in the permeable soil at 25' bg (Plate 4).

No solvent concentrations were identified in the shallow soil on the Angeles property to 5' bg at concentrations greater than 41 ppm PCE, 36 ppm 1,1,1-TCA, and 9 ppm TCE at 1'bg in BH-17; 58 ppm PCE, 19 ppm 1,1,1-TCA, and 5.6 ppm TCE at 5' bg in BH-17; 20.9 ppm 1,1,1-TCA and 6 ppm PCE at 1' bg in BH-15; and 8.7 ppm TCE in BH-14 at 5' bg. Surface grab samples taken immediately below the surficial gravel layer or to 1.5' bg ranged as follows: TCE 4.2 ppm to ND, 1,1,1-TCA 19,000 ppm to ND, and PCE 2,300ppm to 0.17 ppm.

Maximum solvent concentrations dissolved in groundwater were identified in MW-6 at 114 ppm as 1,1,1-TCA, 36.2 ppm as 1,1,1-TCA in MW-4, and 14.3 ppm as TCE in MW-4 on the Angeles property.

Daughter product maximums were identified on the southern border of the Angeles property in November of 2000 as follows: 20 ppm as cis-1,2 DCE in MW-1, 17 ppm as 1,1-DCA in MW-1, and 9.5 ppm as cis-1,2 DCE in MW-2.

3.0) McKESSON SITE CLOSURE

McKesson did not apply for closure of the RCRA barrel storage permit or hazardous areas of the facility when it closed operations in 1986. McKesson closed operations without required pre-notification according to DOHS reports and sold the property. The solvent waste liquid remained pooled in the unlined gravel filled solvent bermed area for at least a year after operations were discontinued in 1986 as identified during a site investigation by Los Angeles County.

McKesson reported in 1989 that no leakage of hazardous materials had been identified on the facility and that the property was not contaminated. McKesson also stated that it did not notify the buyers of the property of contamination since there was none identified. These statements misrepresent McKesson's and the USEPA's test results of 1986, which identified large areas of free phase, DNAPL solvents in the soil and groundwater and, apparently, infiltrating laterally in free, dissolved and vapor phase onto the Angeles property.

4.0) SITE HISTORY

The following regulatory comments provide a chronology of leaks, discharges, pooling and regulatory requirements for testing and remediation of the solvent contamination.

A notice of violation was issued to McKesson on 8/27/80 by the Los Angeles County Engineering Section (LACES) when an on-site inspection identified a discharge of industrial waste with a pH of 1 to the unlined ditch separating McKesson from Angeles. McKesson was ordered by LACES to cease the discharge and clean up the waste remaining in the ditch. In 1984, the USEPA could find no documentation substantiating any characterization or removal efforts by McKesson.

On 8/27/80, the City of Santa Fe Springs also issued a notice of violation and order to comply with "Cease and Desist" solvent waste into the unlined ditch. A written report of compliance was ordered by September 10, 1980. Instead, McKesson installed an automated trap door for discharging into the unlined ditch in 1982.

As a result of the on-site investigation performed for the USEPA during 1984 and 1985 by Ecology and the Environment, Inc., 120 Howard Street, Suite 640, San Francisco, Phone 415-777-3811, on March 20, 1984 the USEPA initiated a site investigation of the McKesson facility.

On April 13, 1984, the DOHS identified several RCRA violations; "free standing liquid in the diked (solvent) area was directed to be disposed of". The McKesson site was cited on 4/13/84 (DOHS Memorandum to File, October 4, 1984) for observed contaminated soil. During a follow on inspection on 7/3/84 it was identified that the soil was "still contaminated".

On October 5, 1984 the Department of Health Services (DOHS) described McKesson's continued dumping of the solvent wastes as "unlawful disposal" based on the October 3, 1984 USEPA site inspection. The DOHS required a site characterization and cleanup plan by October 26 1984.

On 10/25/84 the free standing pooled liquid was identified by McKesson as containing non-RCRA wastes. McKesson dumped a large daily volume of water either into an unlined, gravel filled, bermed pit or directly discharged the solvent waste water onto the drainage ditch separating the two properties. According to regulatory records and direct statements, McKesson only tested the waste for pH and specific gravity and did not test at all for solvents.

On July10, 1985, the USEPA Report (TDD number R-9-8501-14) identified that two waste streams of solvent contaminated water and alcohol were generated at the McKesson facility from used solvent drum rinsing and solvent packaging line flushing. On page 3, section 2.3, the USEPA identified that "...approximately 1,500 gallons per day of corrosive waste water are generated on-site as a result of corrosive drum rinsing operations". The solvent repack operation was placed adjacent to the unlined, gravel filled, bermed above ground tank area (solvent area) approximately 30' to 50' south of the unlined ditch separating McKesson from Angeles. The wash water was drained to a PVC lined concrete neutralization pit and was constantly monitored for pH. The water was monitored for pH and specific gravity only.

On 1/25/85 an enforcement and clean up order was issued for the areas of free standing pooled solvents and water to McKesson by Megan Robinson, DOHS. She identified free standing pond in solvent tank farm.

In 1986, McKesson offered to treat the wastewater when notified by the USEPA and the DOHS that a waste RCRA discharge permit would be required. The DOHS later identified that McKesson failed to do so.

From 1977 to 1998, numerous spills and discharges of solvents were identified at McKesson, 9005 Sorensen, Santa Fe Springs, by the USEPA, the DOHS, LACES, the Los Angeles Regional Water Quality Control Board, the DTSC, and the City of Santa Fe Springs. Surface pooling of liquids was also identified in the solvent storage area during "drive by" inspections.

BEII estimates that massive solvent waste, approximately 5,000,000 gallons were infiltrated, dumped, discharged and seeped onto the Angeles property, based upon the McKesson waste solvent liquid daily usage amounts provided by the USEPA. This massive discharge of solvent waste liquid contained solvents at concentrations of 888,000 ppb maximum dissolved 1,1,1-TCA, for example, about 30 feet from the north edge of the McKesson facility. This concentration is greater than that which would cause vapor saturation of the Angeles property soil (Environmental Forensics, R. Morrison, 1999). The DOHS supports that the "potential for release to groundwater is high on the McKesson Facility given inadequate containment of hazardous substances". The DTSC comments about the McKesson draft Remedial Action Plan, dated 1993, and required that McKesson "prevent migration of VOCs from the unsaturated vadose zone soil into groundwater". McKesson failed to address the maximum solvent concentrations identified in the deleted wells MW-1 through MW-4 and borings SB-1 through SB-3, which exceeded free phase or DNAPL concentrations and posed a threat of infiltration to the groundwater.

BEII identified that McKesson is dumping treated waste into the Santa Fe sewer system at the hook up point adjacent to the Angeles property probably causing a dissolved and vapor solvent plume at the end of the Angeles connector line to the northward flowing sewer.

5.0) UNDERGROUND STORAGE TANKS

In 1985, the USEPA identified the USTs as potential sources of leakage and recommended tank monitoring in accordance with Los Angeles regulations for underground hazardous materials tanks. No records of monitoring were identified in a file search by BEII.

On June 25, 1992, the Harding and Lawson Associates (HLA), Remedial Investigation, recommended that soil samples be collected and analyzed from beneath the underground tanks upon removal. HLA concluded that the "activities and compounds associated with the aboveground solvent –storage area tank appear to have been the primary cause of the concentrations of compounds detected in on-site soils and groundwater".

It was identified that the removed USTs from the McKesson property in 1999 were described as being in poor condition, with significant perforations and holes. No tests were collected of the soil immediately below the tank in accordance with specified Los Angeles County regulations and in accordance with their consultants (HLA 1992) recommendations.

6.0) GROUNDWATER REMEDIATION ON THE McKESSON FACILITY

Geomatrix reported that the McKesson water treatment system was affecting all water northward to the Angeles site, even though solvent concentrations increased 300% the closest well north of the extraction well treatment.

Remediation and testing reports in the after 1989 significantly lowered and moved the maximum concentration point of the solvent southward using a maximum concentration of 200,000 ppb TCA, south of the solvent area instead of 880,000 ppb TCA, north of the solvent area.

7.0) DELETION OF PERCHED WATER AND PERMEABLE SOIL CONTAMINATION DATA

The disregard of the saturated zone identified at 25' bg as a result of solvent waste water dumping and discharging operations biases all evaluation of contaminant migration. It is clear that the solvent flow was massive and northward in this 25' bg zone, which remained saturated at least one year after solvent rinsing operations were closed in 1986.

The lack of data referring to this perched water table and free phase solvents identified at 25' bg causes bias in the flow direction and mass of solvents, which contaminated the soil and perched groundwater on the McKesson facility, with apparent down gradient lateral migration onto the Angeles property. The deletion of the monitoring wells that clearly identified this solvent and water waste at 25' bg with a northward gradient biases both the source of solvents and direction of flow of the perched water existing during McKesson operations. The perched northward water flow from McKesson was driven during facility operations by a pressure head of approximately 20' in the solvent area of McKesson. The dumping of up to 5,000,000 gallons of solvent waste water in the solvent area alone during solvent drum recycling saturated the soil in the solvent area so greatly that surface pooling was identified in the solvent area a full year after solvent drum cleaning operations were discontinued. McKesson, in effect, created a perched water body at 25' bg, which was driven from south to north in the permeable soil by the massive head pressure from the saturated soil column in the solvent area of the facility.

Ignoring this tested perched free phase solvent and groundwater and 20' pressure head driving the water, in essence, misrepresents the northward migration of solvents in the permeable soil at 15' to 35' bg.

However, to the advantage of McKesson's argument that Angeles was leaking on their facility, McKesson or its consultants erased monitoring wells MW-1, MW-2, MW-3 and MW-4 from all future contaminant gradient contaminant concentration maps (Plate 5). McKesson failed to mention the saturated 15' to 25' bg zone in all future correspondence after 1986

although the dumping pit had so saturated the soil column that pooling was identified in an LAC regulatory inspection a full year after operations were discontinued in 1986.

8.0) VERTICAL SOLVENT INFILTRATION ON THE NORTH SIDE OF THE McKESSON FACILITY

McKesson caused vertical infiltration of solvent contaminated water as identified by the USEPA in 1984 and later testing of the resultant shallow perched water at 25' bg in 1986. Investigators for the USEPA, Ms. Patti Cook and Bob Enkeboll, submitted the Site Investigation Report for the McKesson Chemical Company. The above agencies and McKesson identified that the contaminant solvents were discharged via a sump overflow and a trap door in large quantity, up to 15,000 gallons, into the unlined drainage ditch separating McKesson on the south from the Santa Fe Railroad tracks and then the Angeles property.

Seepage was also identified entering the ditch from the McKesson property with the significance that the solvent contaminants had saturated the soil column and were migrating, at least in part, in DNAPL or free phase in the subsurface into the ditch. The infiltration also occurred beneath the ditch as described by Harding and Lawson in 1992. In addition, vertical and then lateral seepage into and beneath the unlined ditch was increased by allowing pooling of the solvents in an area about 30' south of the ditch where ground cover was unlined and exclusively gravel.

The USEPA and Los Angeles County cited McKesson numerous times from 1977 until 1998 concerning surface pooling of the solvent mix, discharges into the ditch and seepage into the ditch without verification that the liquid contents were not solvents. Typically, McKesson would assure compliance. However, on follow through inspections by various agencies months, and, at one point a year after the citation, it was found that McKesson had not complied with the citation either by testing or remediation.

9.0) LATERAL MIGRATION OF SOLVENT CONTAMINATION FROM McKESSON TO THE ANGELES PROPERTY

As stated in the March 3, 1992 memorandum from Jennifer Schroll, DTSC, engineering geologist, "The report includes several plume maps for the various constituents found in the ground water. I am concerned that these plumes do not indicate the direction of plume movement. At first glance it appears that the plumes are moving cross gradient to the direction of groundwater flow... The investigation has determined that the above ground solvent tanks are the main source of contamination in the soils and groundwater".

In deleted McKesson monitoring wells MW-1, MW-2, MW-3, and MW-4 adjacent to the south side of the Angeles property, dissolved 1,1,1-TCA, PCE, TCE, and Methylene Chloride each exceed that concentration, $\geq$ 100 ppm, where partitioning to DNAPL or free phase solvent product will occur (Morrison 1999). In deleted monitoring wells MW-1, MW-3 and MW-4 the dissolved 1,1,1-TCA and Methylene Chloride concentrations exceed that level where vapor saturation will occur in the soil above the perched groundwater. The saturated vapors will cause a lateral vapor gradient in the downgradient direction of the permeable soil zone, which is north

beneath the McKesson facility. The downgradient direction of the permeable zone, at 15' to 25' bg, is clearly shown as northward in the HLA and Geomatrix south to north cross sectional maps of the McKesson and Angeles sites. This permeable sand layer hydraulically connects the McKesson facility and the Angeles property.

Harding and Lawson (HLA) identified the source of solvent contamination at shallow levels (1' bg) in the north section of the solvent area, SB-30, with concentrations at 3,400,000 ppb at that depth. In the south of the solvent area, HLA identified 500,000 ppb at -1' bg in SB-23. HLA identified that the solvent leakage was sourced in this area (Plate 6). Furthermore, HLA identified that the free phase contamination infiltrated vertically to the permeable zone at 15' to 25' bg, where significant lateral migration occurred in the permeable soil sloping northward and 10,000 times more permeable than the underlying clay layer.

Even though HLA identified that McKesson had tested the solvent waste water areas in 1985, HLA states that "chlorinated solvents were detected in both the soil and groundwater in the above ground solvent storage area in these (two) investigations". The attached HLA maps, with the exception of a "previous investigation" map, delete monitoring wells MW-1, MW-2, MW-3, and MW-4 and borings SB-1, SB-2, and SB-3, which identified the highest concentrations of solvents.

Later investigations by Geomatrix in 1993 identified a gradient of residual 1,1,1-TCA at a maximum in the solvent release area of McKesson facility and migrating laterally northward in every well that was tested in the permeable zone at approximately 25' bg.

In addition, HLA identified a 1,1,1-TCA plume in the soil centered in the solvent release area and increasing laterally as a function of depth. Also, in 1990 HLA identified a 1,1,1-TCA groundwater plume migrating onto the Angeles property, even though the maximum concentrations up to 880,000 ppb in MW-1, MW-2, MW-3, and MW-4 were altered and deleted (Plate 7). HLA identified a steep gradient with unusually high maximums in the shallow soil at McKesson facility and migrating northward to the Angeles property at levels higher than found on the property in the shallow soil. Gradient contours of vapor phase migration at 20' bg also shows significant maximums on the McKesson facility with a steep gradient onto the Angeles property.

Gradient profiles of 1,1,1-TCA in the shallow soil, and permeable soils at 15' to 25' bg, identify a maximum dissolved phase of TCA at 273,000 ppb on the south side of the solvent release area of the McKesson facility. While deleting the significantly higher concentrations in MW-1 through MW-4 on McKesson, this lower concentration still represents a 400% increase over the highest 1,1,1-TCA levels found in groundwater beneath the Angeles property.

No 1,1,1-TCA concentrations above 21 ppm were identified from 1' bg to 10' bg on the Angeles property, while 3,600 and 600 ppm as 1,1,1-TCA were identified on the northern solvent mixing area of McKesson facility at 1' bg. Insufficient 1,1,1-TCA mass was identified in borings and wells advanced on the Angeles property in the shallow soil to support vertical infiltration of 1,1,1-TCA at concentrations identified in the saturated permeable zone where maximum 1,1,1-TCA free phase concentrations accumulated. No legacy of 1,1,1-TCA vertical

migration was identified from shallow soil to the permeable zone at 15' bg to 25' bg. This complete lack of shallow 1,1,1-TCA concentrations with significant 1,1,1-TCA concentrations maximized at the deepest point of the permeable zone fully supports that the solvents identified in the permeable zone beneath the Angeles property resulted from un-permitted, virtually continuous discharges of solvents by McKesson.

The maximum levels of dissolved 1,1,1 TCA was identified at 114,000 ppb in the remaining perched water in the depression in the permeable saturated soil located at MW-6 beneath the Angeles property. Attenuation of dissolved 1,1,1-TCA occurred rapidly northward as the depth of the permeable zone decreased. Dissolved 1,1,1-TCA was identified at 36,200 ppb in MW-4, 130'north of MW-6 and then at 90 ppb in MW-7, 30' north of MW-4.

However, shallow soil and vapor testing performed at MW-6 identified an exclusive lateral and minimal vertical infiltration of solvents such as 1,1,1-TCA on the Angeles property. In the 2000 soil vapor survey, 1,1,1-TCA was identified in the shallow soil beneath the Angeles property at 8' bg at concentrations 0.005% to 15% of those concentrations identified in vapor phase at 20' bg. Although 1,1,1-TCA was identified in vapor phase at up to 90,000 ppb at 20' bg in 2000 beneath the Angeles property, only 22 ppb as 1,1,1-TCA was identified in vapor phase at 8'bg. Soil sample analysis from the advancement of MW-6 identified 412 ppb as 1,1,1-TCA at 5' bg and 2,970 ppb at 20' bg. The identification of only 0.4 ppm 1,1,1-TCA at 5' bg supports that vertical migration of the significant levels of 1,1,1-TCA found in the crushed rock supporting the railroad tracks did not significantly infiltrate vertically. However, a steadfast, long lived free phase or DNAPL solvent saturation was identified in the upgradient direction, in the permeable zone on the McKesson facility in the solvent area, where free standing solvent waste water was identified during numerous regulatory site inspections from 1977 to 1987. This long term, free standing, pooled solvent wastewater identifies a head pressure of at least 20', which remained for a year after daily solvent rinsing operations were closed in 1986.

The Angeles property monitoring well MW-1, immediately north of the McKesson solvent area, identified levels of 1,1,1-TCA in the perched groundwater at 9,376 ppb and TCE at 7,160 ppb in 1994 with attenuation to less than detectable levels in 2000. The daughter products 1,1-DCA and 1,1-DCE increased in that same period from 649 ppb to 17,000 ppb as 1,1 DCA and from 2,210 to 3,000 ppb as 1,1-DCE. Dissolved concentrations of cis 1,2-DCE were identified as 20,000 ppb in 2000. Further support that the infiltration of solvents onto the Angeles property from the McKesson facility is evidenced in the complete attenuation of the parent products 1,1,1-TCA and TCE from 9,370 ppb and 7,160 ppb in 1994 to less than 2,500 ppb and 500 ppb, respectively, in 2000. The saturated soil column identified in the northern solvent area of the McKesson facility would cause accelerated migration of the free phase and dissolved solvents and vapors to the down gradient low point of the permeable soil layer identified in monitoring well MW-6 on the Angeles property.

10.0) REMEDIATION AT THE McKESSON FACILITY

Geomatrix estimated that water pumping in the southwest corner of the McKesson facility would capture the solvent discharge area on the northern side and the drainage ditch area of the site. However, the extraction system, implemented in 1995, had no effect on the nearest

groundwater monitoring well 100' north of the extraction well. In fact, 1,1,1-TCA concentrations in this well, SB-23, increased approximately 200% during the extraction treatment.

Geomatrix installed a soil vapor extraction (SVE) system in 1995 to remove vapor concentrations considered unhealthful on the north side of the site. McKesson performed SVE intermittently to remove solvent vapors from 1995 to 1996 and from 1998 to 1999, which precluded underground tank excavation. The system failed to work and was removed without notice during August 1996. A second system was installed in May 1998, without any evidence of notice identified in the file search conducted by BEII. However, McKesson claims that these soil vapors have not migrated approximately 60' laterally in the permeable soil in the 23 years that solvent saturation of the soil and groundwater has occurred at the McKesson facility.

McKesson discharges of 1,1,1-TCA contaminated water were connected to the sewer at the northeast corner of the property, even though extraction was performed in the southwestern area of the facility. These highly volatile discharges have most probably infiltrated into the Angeles trunk line about 100' down gradient of the McKesson injection point. Boring BH-14 and soil vapor survey points identified high levels of 1,1,1-TCA and other solvents beneath the Angeles property at the drain to this sewer connection.

Since McKesson failed to remove the dissolved groundwater plume of 1,1,1-TCA at least at 740,000 ppb on the south side of the solvent spill area and up to 880,000 ppb on the north side and failed to perform soil vapor testing during the 24 years of identified solvent leakage, it must be assumed that the inordinately high soil vapor concentrations migrating from south to north on the Angeles property are the result of evaporation of the free phase solvents in the soil and groundwater on the McKesson facility. No significant 1,1,1-TCA vapors were identified in the shallow soil at -8' bg in all areas of the Angeles property, with the exception of the sewer outlet and the north spill area.

11.0) DEPARTMENT OF TOXIC SUBSTANCE CONTROL REVIEWS OF THE McKESSON REMEDIATION PLAN

Reviews by DTSC geologists identify the attenuation of the northern Angeles property spill and question the ability of this small spill to attenuate southward and then increase to significantly large concentrations in a non-linear concentration on the south side of the Angeles property. Reviews by DTSC staff found that the McKesson remediation proposals failed to define the extent and migration of the solvent contaminants in the permeable soil and groundwater. The reviews also question the ability of the McKesson extraction systems to have any effect on the groundwater, soil and vapor plumes.

12.0) DISCHARGE OF CONTAMINATED WASTEWATER TO THE SHALLOW PERCHED WATER AND ONTO THE ANGELES PROPERTY

The permeable zone at 15' to 25' bg was recharged and kept in a steady state of saturation by the discharge of a minimum of 1,500 gallons per day of hot waste water resulting from steam and isopropyl alcohol cleaning of used 55 gallon drums containing various solvents.

According to the investigator for the USEPA, Ms. Meg Robinson of Ecology and Environment, Inc., solvent drums were delivered daily to McKesson and cleaned by steam and isopropyl alcohol in the gravel and rock covered solvent area on the north side of the facility. The approximate 1,500 gallons per day of solvent contaminated wastewater and alcohol was discharged to the unlined rock and gravel covered, bermed solvent area, based upon the continued pooling of solvents and wastewater and alcohol in the solvent area.

13.0) REFERENCES SUPPORTING LATERAL MIGRATION OF THE SOLVENTS FROM THE McKESSON FACILITY TO THE ANGELES PROPERTY

According to Environmental Forensics, Dr. Robert Morrison, CRC Press, 1999, the area contaminated by the McKesson facility surely extended laterally and onto the Angeles property as free phase, vapor phase and dissolved phase in the perched water at 15' bg to 25' bg beneath the property.

1.) The leakage area was widespread, as evidenced by virtually continuous pooling in the approximate 60' by 60' unlined, gravel covered, solvent area and by water pooling near the sump described as "Lake McKesson" to USEPA inspectors by on-site employees.

2.) It appears that this unlined, permeable, solvent area and the "trap door" sump opening into the unlined drainage ditch between the McKesson facility and the Angeles property acted as a Class I landfill without permit. The discharges accumulated DNAPL or free phase solvents on the south border of the Angeles property sufficient cause vapor saturation and migration onto the property.

3.) As identified by Morrison, chlorinated solvents dissolved in groundwater will significantly saturate the soil above the water with contaminant vapors. For example, 730,000 ppb as 1,1,1-TCA will produce a saturated soil vapor concentration of 132,000 ppmv. If several solvents are in mixture in the water then, in accordance with Rault's Law, several chlorinated contaminants will saturate the soil above the water.

4.) As further identified by Morrison, a soil gas volume of 100 ppmv is "commonly considered" to be indicative of the presence of free phase liquid. Three of the four monitoring wells MW-1 through MW-4 on the McKesson facility identified free phase or DNAPL solvents in the saturated perched groundwater.

5.) Morison further identifies that the large lateral density gradients may exist near a residual source of chlorinated solvents. Vapor densities from steady state free phase solvents can result in vapor velocities of meters per day.

6.) The lateral flow of the solvent will depend on the pressure head and continuity of the pressure head. The McKesson facility pooled liquid tested at 370,000 ppb as 1,1,1-TCA and greater concentrations of other solvents remained pooled at surface for a year after shutdown of the steam cleaning of solvent contaminated drums in 1986, as identified by the DOHS. This pooling of solvent contaminated waste water for a full year after the source of water was discontinued (1,500 gallons per day steaming of contaminated drums) was evidence by the

saturated soil column from surface to the permeable soil zone at 25' bg (hydraulic conductivity of typically 10^{-3} cm/sec), above the impermeable soil at 30' bg (hydraulic conductivity of typically 10^{-7} cm/sec).

7.) The flow of DNAPL or free phase solvent product from the source identified by HLA in 1992 and the regulatory investigators in 1986 identified that the McKesson solvent area has migrated in the relatively more permeable soil from the McKesson solvent area to the lowest point of the permeable zone identified by both HLA and Geomatrix (Geomatrix Figure 5, project 2282z) at well MW-6 on the Angeles property.

14.0) APPARENT MISREPRESENTATIONS OF SOLVENT LEAKAGE, DISCHARGES AND PERMITS FOR SOLVENT DISCHARGE INTO THE GRAVEL AREA AND UNLINED DITCH ADJACENT TO THE ANGELES PROPERTY

McKesson was penalized in 1990 for failing to close the site permitted for drum storage of solvents, only. In 1990, McKesson personnel stated that no leakage or discharges of solvents had occurred at the facility. McKesson further testified that all solvent waste was contained and transported to recycling facilities.

McKesson sold the property in 1986 shortly after discovering the extremely large free phase solvent concentrations in the pooled surface water in the solvent area, in the soil and in the groundwater under the solvent area and migrating onto the Angeles property. McKesson erased the four wells, three borings, and surface pooled solvent test data from all future reports.

The misrepresentations and deletion of data and map diagrams, which clearly identified the McKesson solvent dumping area as the source of saturated soil vapors and non aqueous and dissolved migration of solvents to the Angeles property, caused significant bias of the McKesson reports of migration and remediation.

Finally, the gradient maximum solvent concentrations were moved southward onto the McKesson property implying that the contaminant plume had significantly greater migration distance before affecting the Angeles property.

15.0) McKESSON 's DISREGARD OF REGULATORY REQUIREMENTS FOR SOLVENT TESTING, REMEDIATION AND CLEAN UP

During March of 1984, McKesson told the USEPA inspector, Meg Robinson, that McKesson was "contemplating" installing a carbon treatment system for the yard catch basin effluent that is discharged to the unlined ditch through the trap door of the 2' by 2' by 4' sump. Ms. Robinson informed McKesson that a RCRA permit would be required for discharge of this hazardous waste. The run-off collected in the 2' by 2' by 4', trap door discharge system "is analyzed for specific gravity and pH only". "Apparently McKesson has opted to forego this treatment system since none was observed during the inspection on 2/26/85". "I will be contacting RWQCB on this issue" (contact report to file, Patty Cook to DOHS, 3/25/85 Phone 213-620-2380).

16.0) REGULATORY COMPLIANCE DEMANDS AND LACK OF RESPONSE BY McKESSON

March 20, 1984 Site Inspection Report prepared by Patty Cook for USEPA:

1.) McKesson Chemical Company was identified for a preliminary site investigation under the Superfund program as a result of on- and off- site hazardous material spills and discharges which were documented in regulatory agency files. Although file information indicated that the facility had a spill history, no documentation could be located to confirm that adequate characterization and remediation measures had been taken.

2.) McKesson has had substantial spills and leaks in both the solvent and acid storage area- see ERRIS file.

3.) Materials stored in above and below ground tanks, piped to blending/packaging areas.

4.) Current waste streams are generated at the facility

A.) Corrosive wastes from drum rinsing
B.) Solvent saturated isopropyl alcohol from flushing the solvent lines in between packing.
C.) The 1,500 gallons per day wash water is drained to a PVC lined -concrete neutralization pit prior to discharge to the LA County sewer.
D.) Storm runoff follows the slope to a 2' by 2' by 4' concrete catch basin. Catch basin is equipped with a locking gate valve, which controls the flow of runoff to an off-site unlined ditch.

5.) Contact Report, May 7, 1985, LARWQCB Patty Cook, John Lewis-Stan Barnhill, McKesson facility production manager claimed an NPDES permit had been issued for the discharge of facility runoff to an off-site adjacent ditch, tributary of Coyote Creek-no record of permit-may be an LA County Sanitation District discharge permit.

Correspondence from LACES:

1.) Los Angeles County Engineers Report 3/24/80 indicated that a liquid with pH 1 was contained in the catch basin. An NPDES permit for this facility was not included in the CERCLIS file. According to JOHN LEWIS, RWQCB, an NPDES permit is not on file for this site but may be required based on the nature of the discharge.

2.) April 7, 1980-NOTICE OF VIOLATION-All liquid waste spills in the tank farm to be cleaned up, Industrial wastewater discharge record must be kept and available for inspection, Yard catch basin must be kept free of industrial waste at all times. -Jerry Wong, Industrial Waste Inspector.

3.) Los Angeles County Engineer's inspection files (8/27/80) also indicated that the facility was issued a Notice of Violation in response to an observed discharge of industrial waste

to the unlined ditch. Documentation substantiating and characterization or removal efforts could not be produced during inspection.

4.) August 27,1980-initial NOTICE OF VIOLATION-to McKesson-discharging industrial waste into the unlined ditch is as violation of the above city Ordinance number 562 under the terms and conditions of Industrial Waste Disposal Permit 3185, 1980. Cease and desist, clean ditch a once, Report to Dept of County Engineer, Sanitation Division by September 10, 1980.

Correspondence from Meg Robinson:

1.) PHONE MEMO Megan Robinson to McKesson, Bill Crumm, 6/1/84. "Requesting Written Proposal Of Soil Containment And Cleanup".

2.) October 4, 1984 Memo to File-from Megan Robinson, State of California-On July 7, 1984 soil (in the solvent area) was re-inspected and found to be still contaminated. On 10/3/84 a letter was drafted to Douglas Eisner requesting a site characterization and cleanup plan by October 26,1984. No McKesson response to this re-inspection report was identified in the file search.

Correspondence from USEPA:

1.) USEPA field section-Hazardous Materials Sample Analysis 1986 which identified heavy vapor and significant dissolved solvent liquid-northeast corner -plant drainage, liquid standing pond-solvent farm, liquid-standing water in tank farm, liquid-standing water in the caustic tank farm. Laboratory Report, Hazardous Materials Unit Southern California Laboratory Section, SCL Number 78942895, 3/26/85-1,1,1 TCA 370 mg/L-GCMS analysis of headspace vapors, SCL Number 2895, 3/26/85-Methylene Chloride, 1,1,1, TCA, Toluene, PCE- all described along with Acetone as very large.

Correspondence from DOHS:

1.) April 27, 1984- NOTICE OF VIOLATION by California Department of Health Services.

2.) October 5, 1984-DOHS, "You are to submit a site characterization and cleanup plan to this office by October 26, 1984". The plan must propose methods of identification of groundwater contamination associated with the unlawful spill.

3.) DOHS, RCRA 4/13/84 AND 7/3/84 Issued Cleanup and Abatement Order.

Correspondence from DTSC:

1.) 1988-08/25/88-Report of Violation issued to McKesson, DTSC, Jerry Little.

2.) 1990 proceedings against McKesson for failure to close RCRA drum storage area and site as a whole.

3.) Oct 4, 1989, DTSC Saebfar, Program Supervisor, Site Mitigation Unit to Mr. Bob Ritchie of McKesson.

The department has reviewed your workplan "Remedial Investigation and Field Study", July 17, 1987 and found it to be "found it to be insufficient".

17.0) REGULATORY REVIEW COMMENTS-McKESSON TEST AND REMEDIATION PROGRAM

December 20,1990,DTSC, VIA-Larry Peterson, Sr. Eng. Geologist, to Hector Vega, Engineering Geo, to Douglas Suzuki, Associate Hazardous Materials Specialist.

I agree with McKesson that further work is required.

1. Further delineate the occurrence, distribution, and flow direction of ground water.
2. Provide additional control points to further characterize ground water flow directions in the aquifer.
3. Enhance delineation of the water-bearing zone.
4. More accurately determine the lateral extent of contaminated area, and assess its potential to migrate.

8/28/2000 Memorandum- comments concerning Interim Remediation Measures Implementation Report, Former McKesson Facility, 9005 Sorensen Ave., Santa Fe Springs from DTSC, Cypress, Ron Okuda, Eng. Geologist, Geological Services Unit (GSU).

As requested -GSU reviewed IRM dated April 2000, prepared by Geomatrix Consultants for McKesson.

Based on the information reviewed:

1.) Significant soil and groundwater data gaps that need to be resolved
   a. The Reports have not demonstrated that the interim remedial measure of hydraulic containment of the groundwater has been achieved.
   b. "It does not appear that the groundwater contamination at the site was adequately characterized to determine the extent of contamination".
   c. "The report also fails to provide initial baseline contaminant concentration levels and regularly scheduled monitoring data".
   d. 'Without initial site characterization data, established performance criteria for the interim measure and regular monitoring of the groundwater, it is not possible to evaluate the effectiveness of the interim remedial measure".

General Comments:

1. "GSU strongly believes that the site has not been adequately characterized. It does not appear that the lateral and vertical extent of soil and groundwater contamination have been defined.

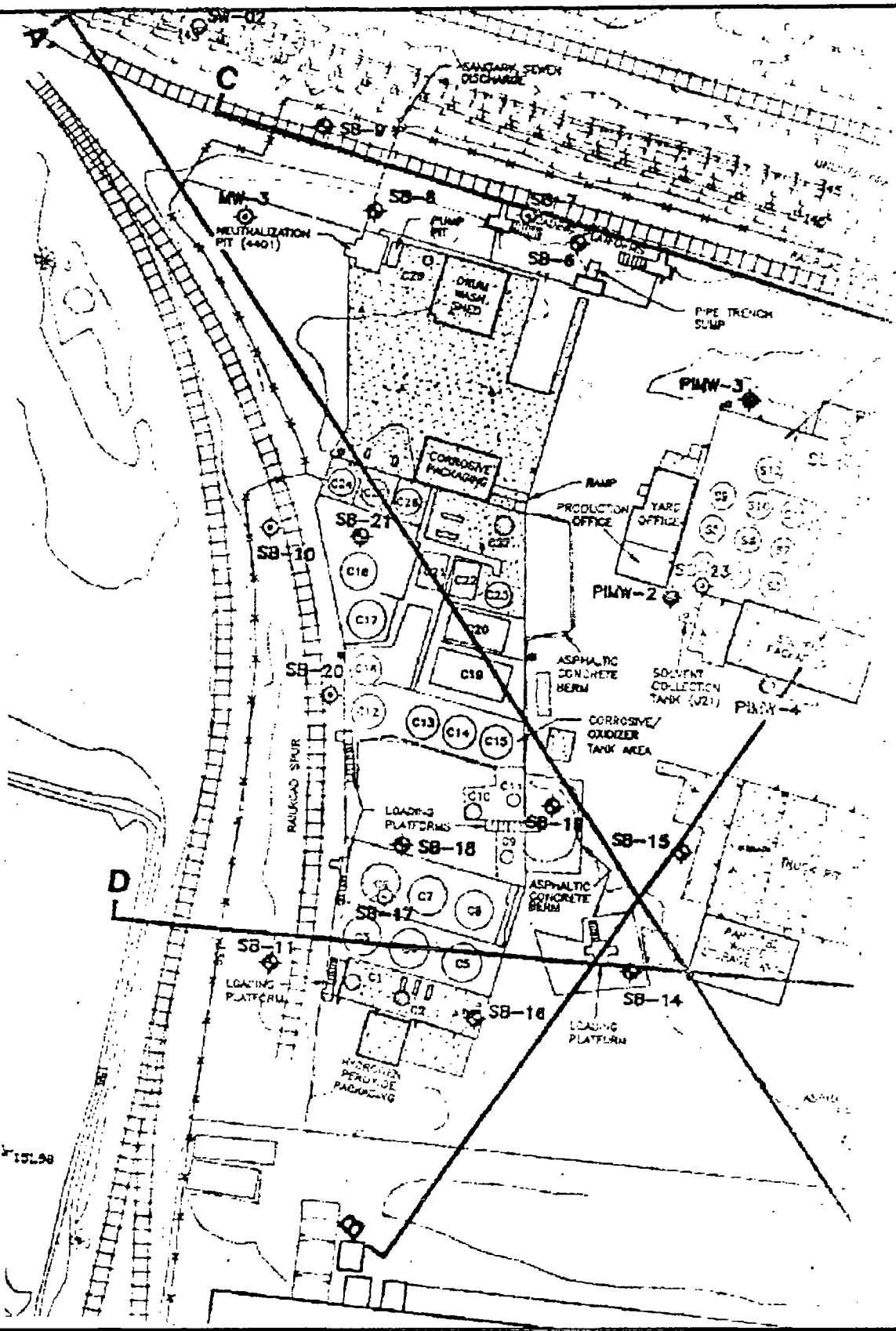
GSU strongly recommends that s soil and groundwater investigation of the entire site be conducted to establish contour maps of the contaminant concentrations.

18.0) SOURCE OF SOLVENT CONTAMINATION INFILTRATING VERTICALLY TO THE PERCHED WATER ZONE AT McKESSON

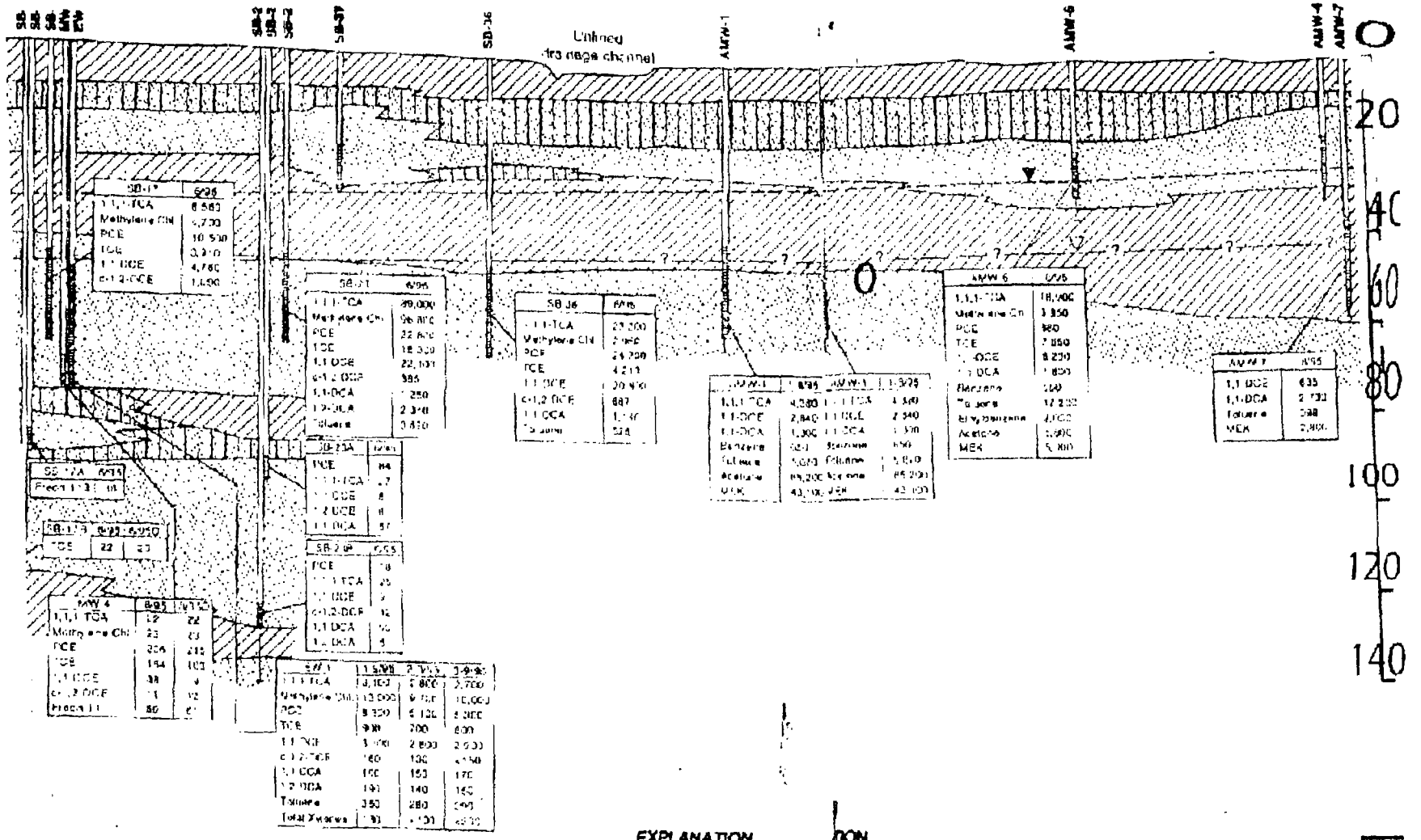
Harding and Lawson (HLA) in October 30, 1992 stated:

"Elevated concentrations of organic chemicals detected in the soil and groundwater samples collected during the RI indicate the presence of one primary onsite source area for the observed chemical concentrations. The highest concentrations of chlorinated organic compounds were detected in the aboveground solvent storage area".

"The principle source area for introduction of compounds in the subsurface appears to be the above ground solvent storage area... The data indicate that liquid solvents migrated vertically downward to the base of the upper sand zone (approximately 25' bg) with minimal lateral spreading". At this depth, the transition from the upper sand zone to the underlying silts and clays is characterized by a large increase in permeability (from $2.5X10^{-3}$ to $7.3 X 10^{-7}$ cm/sec), which promoted the lateral spreading of the liquid phase solvents that infiltrated through the sandy zone.



Blakely Environmental Investigations, Inc. P.O. Box 339 Wrightwood, CA 92397	**McKesson Facility**	**PLATE 1**



Blakely Environmental Investigations, Inc. P.O. Box 339 Wrightwood, CA	**Lithologic Cross Section** **McKesson Facility**	**PLATE 2**

MCKESSON ENVIRONMENTAL SERVICES

7520-00
Santa Fe Springs
McKesson Chemical

PRIORITY POLLUTANT ANALYSIS

Lab Number: 8603123-18
Sample I.D.: MW-1
Date Received: 03-25-86
Date Analyzed: 04-15-86

Detection Limit Factor: 500

VOLATILES	CONCENTRATION µg/L
benzene	ND
bromodichloromethane	ND
bromoform	
bromomethane	
carbon tetrachloride	
chlorobenzene	
chloroethane	
2-chloroethylvinyl ether	ND
chloroform	ND
chloromethane	ND
dibromochloromethane	
1,2-and/or 1,4-dichlorobenzene	
1,3-dichlorobenzene	ND
1,1-dichloroethane	
1,2-dichloroethane	ND
1,1-dichloroethene	
trans-1,2-dichloroethene	
1,2-dichloropropane	ND
cis-1,3-dichloropropene	ND
trans-1,3-dichloropropene	ND
ethyl benzene	ND
methylene chloride	430,000
1,1,2,2-tetrachloroethane	ND
tetrachloroethene	110,000
toluene	18,000
1,1,1-trichloroethane	880,000
1,1,2-trichloroethane	
trichloroethene	
vinyl chloride	ND

OTHER COMPOUNDS FOUND	CONCENTRATION µg/L
freon 113	500
acetone	430,000
isopropanol	130,000
methyl ethyl ketone	210,000
hexane	ND
heptane	ND
butyl cellosolve	130,000
cellosolve acetate	ND
ethylene glycol	ND
propylene glycol	ND

Gary Costley MKB
Laboratory Supervisor

ND = Not detected.
* = Compound detected; concentration below level for accurate quantitation.
** = Estimated value; compound saturated detector.

Blakely Environmental Investigations, Inc.
P.O. Box 339
Wrightwood, CA 92397

McKesson MW-1 Groundwater Results

PLATE 3

Table 7. Summary of Soil Analytical Results
March 1986

	Boring Number					
	B-1	B-1	B-1	B-2	B-3	MW-2
Depth (ft)	25	30	37	35	36	25
Acetone	23	200	60	2.7	1.4	5.4
Butyl cellosolve (2-butoxyethanol)	(50)	390	87	(50)	(50)	(50)
2-(2 butoxyethoxy) ethanol	—	44	—	—	—	—
1,1-dichloroethane	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
1,1-dichloroethene	0.93	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Ethylbenzene	0.63	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Freon	0.78	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Methanol	2	11	5	9	8	(1)
Methylene chloride	0.20	4.3	1.8	2.2	3.5	
Methyl ethyl ketone	(0.125)	130	51	2.0	(0.125)	(0.125)
1-(2-methoxy-1-methylethoxy)-2-propanol	—	20		—	—	—
Naphthalene	(0.2)	0.2	(0.2)	(0.2)	(0.2)	(0.2)
2-phenoxy ethanol	—	49	—	—	—	—
Tetrachloroethene	94	2.2	0.13	0.05	0.18	0.05
Toluene	3.7	0.20	(0.025)	(0.025)	(0.025)	(0.025)
Total Hydrocarbons (low tomed BP)	14	37	(1)	(1)	(1)	(1)
1,1,1-trichloroethane	56	2.0	0.08	0.03	1.1	(0.025)
Trichloroethene	0.55	0.10	(0.025)	(0.025)	(0.025)	(0.025)
Xylenes	2.7	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)

Notes:

All concentrations in milligrams per kilogram (mg/kg).
( ) indicates concentration below enclosed detection limits.

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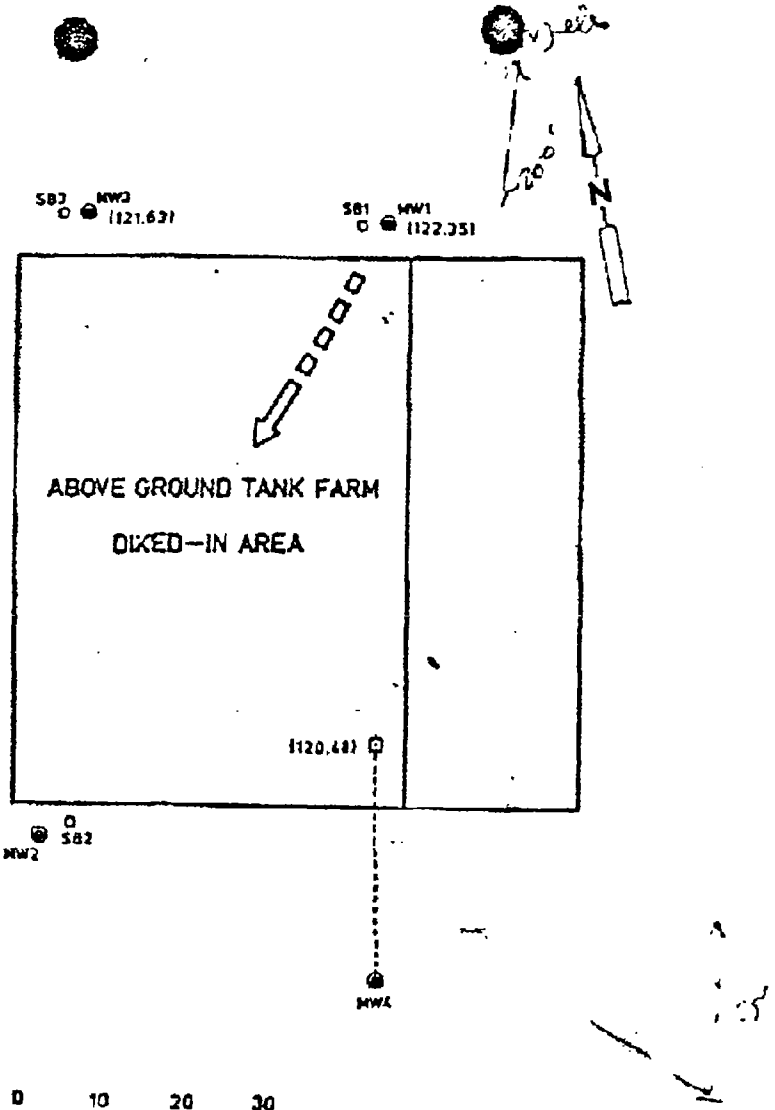
Blakely Environmental Investigations, Inc. P.O. Box 339 Wrightwood, CA 92397	**1986 McKesson Soil Sample Results**	**PLATE 4**



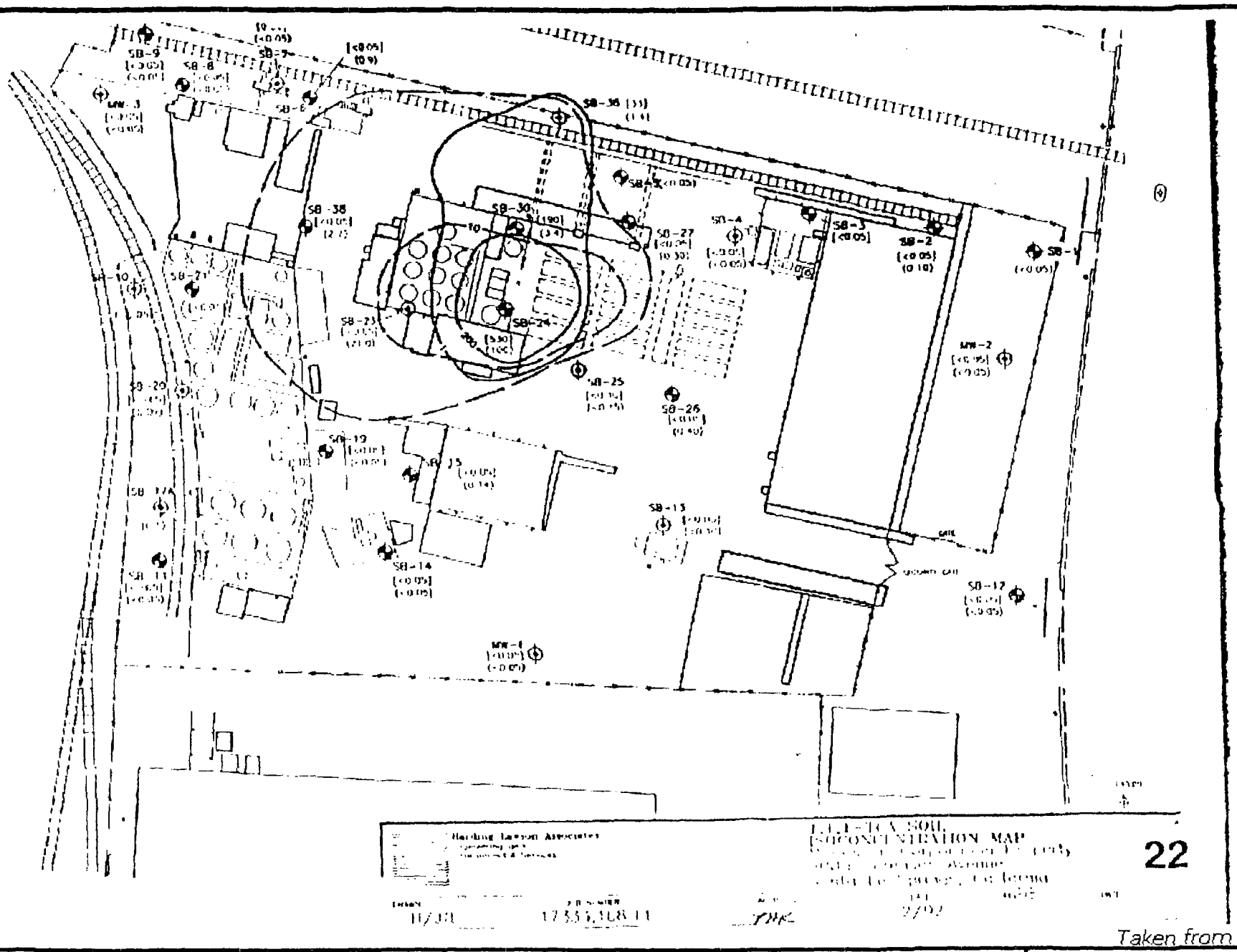
LEGEND

- SLANT BORING
- GROUNDWATER MONITORING WELL AND ELEVATION OF GROUNDWATER LEVEL IN FEET-MSL - 4/8/88
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER LEVEL ELEVATION IN FEET-MSL IN WELL MW4 - 4/8/88

ANALYSIS OF GROUNDWATER MOVEMENT

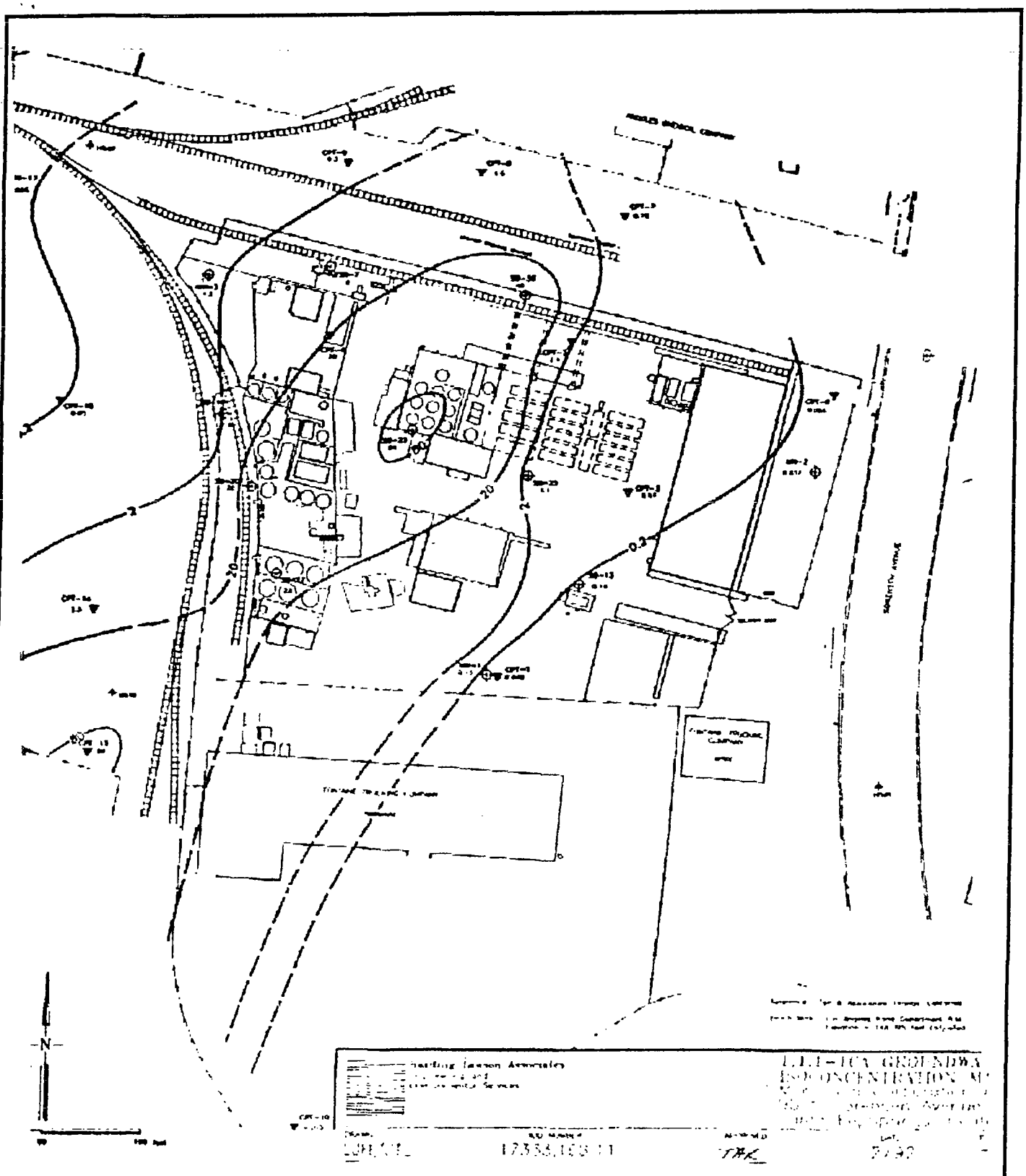
FIGURE 2

Blakely Environmental Investigations, Inc. P.O. Box 339 Wrightwood, CA 92397	**McKesson Facility Well Locations**	**PLATE 5**



Taken from HLA

Blakely Environmental Investigations, Inc. P.O. Box 339 Wrightwood, CA	**Extent of 1,1,1-TCA in Soil at McKesson** **McKesson Facility**	**PLATE 6**



Blakely Environmental Investigations, Inc. P.O. Box 339 Wrightwood, CA 92397	Extent of 1,1,1-TCA in Groundwater at McKesson **McKesson Facility**	**PLATE 7**